Farmer Based Seed Production of *Leucaena leucocephala* in Eastern Indonesia

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Presenter Information

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Introduction

Leucaena leucocephala cv. Tarramba was first introduced to Indonesia in 2001 as an activity of ACIAR Project AS2/2000/157. It has now become the most popular variety used by agencies promoting the use of leucaena for ruminant feeding in Eastern Indonesia (Nulik *et al*. 2004). The greater adaptability and higher production of Tarramba, even in the dry season, its erect growth habit as well as its tolerance of the psyllid insect (*Heteropsylla cubana*) compared to the ubiquitous 'common' leucaena, has been frequently observed (Nulik *et al*. 2004).

The cultivar has attracted much interest from farmers and other stakeholders who request seed for its wider development as high quality forage for feeding cattle. This increasing demand highlights the need to understand the best practices for establishment and management, and the need for local supply of good quality seed. Lack of seed availability is one of the most important barriers to the wider distribution and use of Tarramba. It is estimated that at least 1000 kg and perhaps as much as 5000 kg of Tarramba may be needed annually to ensure adequate seed supply.

Materials and Methods

The purpose of this program was to study the seed production characteristics of Tarramba in East Nusa Tenggara with the aim to ensure adequate seed for its distribution and use in Indonesia. Specific objectives were to establish seed orchards and to observe seed production characteristics at sites with different characteristics, namely:

- Sites where 'common' leucaena has been intensively used and grown for feed to ruminants.
- Sites where little or no 'common' leucaena is present.
- Sites with a range of soil types (Vertisol, Alfisol and Karts Limestone).

Accordingly in 2011, seed orchards were established at 9 on-farm sites in Kupang district of Nusa Tenggara Timur (Kuanheum, Oeli, and Batulesa in West Kupang sub-district; Naunu and Oebola Dalam in Fatuleu sub-district; Ponain, Tesbatan I and Tesbatan II in Amarasi sub-district) for seed production and for forage purposes. Three sites were also established in East Sumba (Wanga, Laindeha and Kambatatana). At BPTP Lili Research Station near Naibonat, Tarramba was planted in alleys (1.5 x 4 m) and pruned to 4 branches/plant for better seed production. In other seed orchards, a range of planting arrangements was established (1 x 1 m, 1 x 2 m, 2 x 2 m and 1 x 5-8 m).

Results and Discussions

Since its introduction to Eastern Indonesia (Timor and Sumba) more than 5000 kg of seed have been produced by famers (in Ponain, Oebola, Lili, and Silu) and by staff of Lili research station for distribution within the province and to other places in Indonesia (NTB, Bali, Bogor and Sumatera).

In Eastern Indonesia, seed of Tarramba can be harvested in the first year, 8-9 months after planting. This was observed in Kuan Heum and Oebola Dalam on well drained alfisol soils. However, very little seed production was observed when Tarramba was grown on fertile black soils at Naibonat and Batulesa. The lower seed production may be due to the more fertile soils and higher moisture environment in the first year inducing higher vegetative growth rather than seed pods. Seed production did not vary greatly between the various planting arrangements, however it is anticipated that differences will be observed as plants mature (some plants are yet to produce seed) and competition between plants impacts seed production. Observations indicate that young trees may produce between 60 to 130 g of seed in the first year (Fig. 1), while a mature tree can produce up to 1-2 kg of seed/ year (Dule Mata, personal communication).

In contrast to Australia, seed of Tarramba produced in Eastern Indonesia has a low level of hard seed. This may be attributable to the climatic conditions present during seed development and maturation. In Australia, Tarramba is produced in Queensland in a subtropical dry environment (average rainfall 600 mm) with seed maturing during the dry and cool winter season, whereas in Eastern Indonesia, seed is produced in a higher rainfall tropical environment

Figure 1. Tarramba seed producion in the first year.

Figure 2. Tarramba plot potential for seed production and forage.

Figure 3. Farm based Tarramba seed orchard in Nagekeo, Flores.

with seed maturing during the long hot dry season.

In the oldest Tarramba orchard of 2.5 ha at Ponain in Amarasi subdistrict, planted in 2001, apart from being harvested for forage, the owner harvests around 300 kg of seed per year which can be sold at 50,000 Indonesian Rp. (IDR) per kg (A$5 per kg) (Fig. 2). Thus an additional 15 million IDR was earned annually by the farmer in addition to his cow-calf operation of about 14 cows (a total of 21 head cattle), which enabled the farmer to gain about 70 million IDR in a year by selling calves and feeders, of either Bali cattle or cross breeds (Bali x Simmental, and Bali x Angus).

The best opportunity to produce high quality pure seed was observed on sites where little or no 'common' leucaena was present. This reduces the likelihood of contamination of Tarramba seed with seed of the 'common' naturalised leucaena. Thus, sites such as Oebola Dalam, Kuanheum (in West Timor), and Kambata Tana (in East Sumba) have great potential for pure seed production for distribution in the province and other regions of Indonesia. Similarly, the high fertility volcanic soils of isolated locations such as Flores, where leucaena is rarely grown, have great potential to produce Tarramba seed (Fig. 3).

Our experiences confirm those of others in Southeast Asia (Hare and Phaikaew 1999) that working with farmers is the best way to produce high quality seed, with farming families responsible for harvest and cleaning. This approach is more cost effective than seed produced on Government Research Stations. In addition, it provides a source of extra income to the farmers to supplement the benefit of obtaining high quality fodder. However, farmers need training on how to produce, store and manage distribution of seed that has high purity, is free from damaging insects and has a high germination percentage.

Conclusions

Farm based seed production is the best approach to address the current shortage of Tarramba seed in eastern Indonesia. Isolated locations where 'common' leucaena varieties have not been planted are best chosen to commence production. Such farm-based seed production will provide a new source of income for farmers. Continued farmer training on orchard management is required. Monitoring of seed production at the various sites, soil types and planting arrangements will continue as Tarramba matures. The effect of cutting management on seed production will also be investigated.

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